their condition being much advanced by the hot, dry weather. The early hay crop was good, but there has been practically no late crop of hay. Alfalfa is about one-half crop, cow peas and soy beans about two-thirds of a crop, and spring-sown clover and bluegrass about 60 per cent of a crop. Pastures were completely burned up, and live stock suffered materially on account of short pastures and scarcity of water. The fruit crop was small and gardens were practically a failure, there being hardly any tomatoes, beans, peas, or sweet corn. The onion crop is unusually short and potatoes are practically a failure. A farmer who has 8 acres in late potatoes in the vicinity of Louisville, and who follows the most modern methods of farming, states that he has hardly a potato in his entire 8 acres. There were practically no early potatoes, and this is classed among the potato-growing sections.

There was no water at all in many small streams, and wells and springs that were never known to fail before have gone dry. Water for stock is a serious problem in many localities, and many fires have occurred as a result of the dry weather. A match dropped in a pasture is likely to cause a disastrous fire. The water supply of many towns has given out, and in some counties the situation is so severe that groundhogs, squirrels, and quail have been forced to come to the vicinity of farmhouses for water. In one section hundreds of snakes were seen crawling around in an apparently dazed condition, famishing for water.

Reports from several sections in the burley tobacco district state that about one-half of the tobacco has now been cut and the crop is much shorter than the lowest estimates had placed it.

Mr. J. W. Newman, commissioner of agriculture for the State of Kentucky, says:

> My crop reporters have sent in a good deal of scattered information about the effects of the drought in different parts of the State. Summarizing these, together with my personal observations: The drought has extended from the Mississippi to the eastern borders of Kentucky, gradually growing less severe as the mountains are approached. There has been an occasional streak throughout the State that has had local showers which have saved the crops more or less in the limited area. It appears that the lack of moisture has not done so much damage as the excessive heat. The pollen of the corn seems to have been rendered more or less infertile. Many of the apparent ears of corn are nothing but cobs, showing a lack of fertilization. Reports come to this office that many ears of corn have a dry rot that is going to injure very materially the partial crop that has been made. Stock has suffered for water but has not been bothered as much as usual by flies. The dry weather seems to have prevented the hatching of insects that depend on decaying vegetation as a means of producing life. Typhoid fever has been reported in many sections, attributed to the stagnant supply of water. Fires have been reported as being numerous as a result of the dry conditions of the pastures. The excessive heat has rendered work on the farm very difficult. Horses have been unable to do more than a half-day's work on many days, and day laborers have been unable to withstand the heat and do a full day's work.

The cool, dry weather which largely prevailed during the months of April and May and in early June was detrimental to the crops, the effect being to retard the germination of seed and the early growth and development of the plants.

Beginning with the excessive rains and floods of January and the extraordinary rains and the severer floods of March, the deficiency in rainfall during the crop-growing season, from April 1 to date, the unseasonably cool weather of April, May, and early June, and the excessive heat from the middle of June to date, September 13, have made 1913, so far, one of the most disastrous seasons in recent years.

THE DROUGHT OF 1913 IN TENNESSEE.

By ROSCOE NUNN, Section Director.

Beginning about the middle of June, temperatures were almost steadily above normal for nearly three months, or until September 12, there being only 16 days during this time with mean temperature at Nashville normal or lower, and such breaks in the heat as came were of unusually short duration.

The afternoon temperatures especially were high, the records showing 69 days from June 1 to September 10, inclusive, with maximum temperatures 90° or above. This is the greatest number of such days on record at Nashville for the corresponding period, as only one other year, 1881 with 68 such days, approaches it in this respect.

The year 1901 had a very warm July, but the summer as a whole was not as warm as 1913, and the drought in 1901 was comparatively short.

For the summer as a whole, mean temperatures have been as follows for the hottest summers: In 1874, 81.6°; 1881, 81.0°; 1913, 79.8°. The present summer therefore has not been the hottest on record, nor does any month of the three, June, July, and August, show a higher mean maximum or mean minimum than any previous corresponding month. But 1913 is one of three hottest summers, considering the record in its various arrangements. For night temperatures, the summer of 1913 takes about the sixth place, considering the summer as a whole, for the average was highest in 1874, second highest in 1900, third in 1881, fourth in 1889, and fifth in 1901. For continued high-day temperatures, however, the summer of 1913 has not been surpassed, although the extreme record for no month was broken until September 3, when the record was a fraction of a degree higher than ever before registered for September. This hot spell has been especially characterized by its persistence, the periods of cloudiness or of falling temperature being few and brief. The percentage of bright sunshine was greater than in any previous summer since instrumental records of sunshine began.

The total rainfall for the three months, June, July, and August, is the lowest on record for Nashville; but the corresponding period of 1907 had almost as light, while 1881 and 1902 are the next driest, in order. The total rainfall for June, July, and August in the years mentioned was as follows: In 1913, 5.84 inches; 1907, 6.00 inches; 1881, 6.37 inches; 1902, 7.35 inches.

The drought of 1913 was pretty well broken at Nashville during the first half of July, but during the last half of July and all of August it was very persistent. For the three months there were only 17 days with measurable rainfall, while the other years of drought show from 20 to 33 such days. In this respect 1913 was quite different from 1907, next to 1913 the driest summer, which had 28 days with measurable rainfall.

EFFECT UPON CROPS, ETC.

Notwithstanding the droughty conditions in the State, there were showers in various sections, and some localities suffered much less than others, the local character of the rainfall being frequently remarked upon, and some sections seemed not to suffer much from drought until about the middle of August. During the last half of August and the first 10 days of September the drought increased in severity and became quite general over the State.

The damage to corn was probably about 40 per cent, to early corn not so much, but to late planted 40 to 60

per cent. In some localities late corn is almost a complete failure, although the damage is not so great in the western counties as in most of the middle and eastern portions. Cotton did not suffer much until about the middle of August. It is now, September 17, damaged probably 10 to 15 per cent by drought. Tobacco plants are small in many fields and the leaves are badly burned. Peanuts will probably not make more than a fourth of a crop, as the drought came at a critical time for them. Late cuttings of hay will amount to little, and pastures are dried up almost everywhere except in favored spots. Plowing for fall crops has, of course, been delayed and farm work seriously affected thereby.

The water supply is giving out in many localities, and in a few places it is reported scarcer than ever known before. But over most of the State there has been only inconvenience, not actual suffering, on account of lack of water, as many springs and streams have been available where wells gave out. Many hogs and cattle are being sold at great disadvantage on account of dried-up pastures and scarcity of feed.

It is not believed that the drought of 1913 is unsurpassed in its damaging effects upon crops, but it is among the worst in the last 30 years. June was very favorable for cultivation and the first half of July received rains which prevented serious damage to corn until about the 1st of August, by which time a good portion of the corn had fairly matured. Cotton was fine until the middle of August. Late crops of all kinds were very seriously damaged.

DROUGHT AND HEATED PERIOD OF 1913 IN ILLINOIS.

By H. M. WILLS, Acting Section Director, Springfield, Ill.

A careful study of the climatological records of Illinois reveals the following facts in connection with the heat wave and drought of the summer of 1913: The summer mean temperature is the highest on record in Springfield and the State mean is the highest on record for the State, with the single exception of the year 1901, which was but a fraction of a degree above this season's record. The maximum temperature during the period was the highest on record for Springfield, except the year 1901, and the State maximum was the highest, except 1901 and the year 1911, when the record was equaled. Both Springfield and State records for number of days with 90° or over are without precedent, except that 1901 exceeded this year's record for 100° or over, in Springfield. That was one of the prominent features of the heat wave of 1913, the daily temperatures remaining high during long periods and in many instances without much relief at night.

The Springfield total precipitation for June, July, and August, 1913, is the least on record since 1908, with but three other years showing smaller amounts, while the State total is the lowest since 1894, and there were but three other years with lower records than 1913. The large deficiency of this season's fall as compared with the average during the last 36 years is noteworthy.

Special features of the drought and heat wave are brought out in more or less detail in the following description:

Deficiency in rainfall and abnormally high temperatures began early in May in many sections of the central and south portions of the State and in several cases date back to the middle of April. The May totals were 2 to 4 inches below normal over the south two-thirds of the State, while the falls were equally excessive over the north one-third. High maxima occurred, breaking records for May in some counties. The drought was becoming serious at the close of the month, affecting vegetation materially.

It continued dry and warm through the first two decades of June, with crops suffering from the drought. Oats began heading very short, due to the stunted condition from the drought; corn did not germinate, and pastures were short, but the situation was somewhat relieved in sections by beneficial rains from the 21st to 25th of the month. The monthly total was the lowest on record for June in the extreme south. Maximum temperatures were high from the 15th to 21st breaking June records in many counties of the central and south portions. The last few days were very hot, the temperature reaching or exceeding 100°. The temperature at Springfield continued above normal through the entire month, except from the 7th to 12th. Eight fatal prostrations were reported in the State (excluding Chicago), and no doubt a much greater number occurred that were not reported to us. A great number of horses died, and miners were reported to have quit work on account of the heat.

The same droughty conditions continued through the greater part of July becoming most serious over the west-central and east-central portions. Although generous rains fell over limited portions of the northwest and the extreme southwest, the major part of the State received little rain, and least July records were broken in many localities (Peoria dating back to 1856), and the absolute minimum for any month was recorded at La Harpe and Monmouth. Most rains were of the thundershower type and covered limited areas. Lack of rain in the north third was not felt much until the latter part of the month on account of the abundant rains of May and June, but the south two-thirds suffered greatly. Reporters stated that wells were going dry and springs and streams that had never been known to go dry were without water; and dust in country roads was apparently bottomless. Water hauling by railroads and stock raisers and others was a frequent occurrence; ground became parched and crops suffered greatly from the severe drought; vegetation turned yellow and much of it withered; and corn began firing badly during the latter part of the month. The temperature reached the high mark of the season, 108° near the middle or end of the month. One observer recorded the highest on record for the station. There were a large number of heat prostrations in the State, and one observer reported horses dying in his vicinity at the rate of one a day during harvest.

In the August reports the observers continued to mention the effects of the hot dry weather on vegetation, but the drought was partially relieved in many counties during the first half of the month, while in other sections the situation was not relieved until the middle of September, and in a few localities observers report the continuance of the drought at the present writing (September 27). The greatest deficiencies in the August rainfall occurred in the south and west-central portions, while the fall was excessive over the extreme northwest. The least August records were broken in many localities. The north fourth of the State was fairly well watered while no county in central or southern Illinois had sufficient rains up to the end of August. The maximum temperature was near or above 100° throughout the greater part of the month and at Springfield there were but two days below normal. Previous high temperature records were equaled or exceeded at 22 stations.